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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,207	09/13/2006	Hannu L. Suominen	20750-00003-US1	6699
30678 7590 03/16/2010 CONNOLLY BOVE LODGE & HUTZ LLP 1875 EYE STREET, N.W. SUITE 1100 WASHINGTON, DC 20006				
EXAMINER				
THAL SUSAN				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/540,207

Applicant(s)

SUOMINEN, HANNU L.

Examiner

SUSAN THAI

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/22)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date 20050920

DETAILED ACTION

Status of Claims

1. Currently claims 1-20 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "...controlling the cell current by automation at the point of cell's resonance energy to produce a strictly controlled electric field in the cell" (claim 1, lines 11-12 and claim 6, lines 14-16) was not described in the specification such that one skilled would know how exactly the cell's resonance was measured and controlled.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1, 3-8 and 10-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (Us 4872959) in view of Haivala (US 5022974).

Regarding **claims 1 and 6**, Herbst discloses treatment of waste water using electrochemical flocculation (C1/L10-23) where water to be cleaned is passed through an electrolytic cell provided with two metal electrodes of different negativities (17 and 23) (see Fig. 1, different negativities are inherent in order for separation to occur); performing electrolysis between the two electrodes such that the more electronegative electrode is non-wearing in a cleaning process and is used for producing hydrogen gas and hydroxyl ions from water (C10/L57-66 and C11/L13-18); the less electronegative electrode is an active wearing electrode used for producing metal ions in a solution to be cleaned (C10/L12-13, the anode produces metals if metals are not added separately); controlling the cell current by automation to produce a strictly controlled electric field (C7/L20-33 where the different voltages are applied across the rod which is controlled by the voltage source and inline resistor); effecting in the cell the strictly controlled electric field a desired oxidation (abstract, a desired oxidation is inherent in order to remove the suspended particles); reduction reaction for removing one or more

designated impurities from water to be cleaned (abstract and see examples I-III); feeding the mass flow from the cell to a separation tower of a flock and purified water (see Fig. 1 and C7/L34-50); using coaxial pipes as electrodes, the inner electrode pipe being the more electronegative electrode, having holes (see Fig. 1, C9/L6-9 and abstract). Herbst further discloses that the system can be periodically reversed so as to aid in the cleaning of the cathode portion (C7/L46-50).

Herbst, however, does not explicitly disclose feeding flush water by pressure.

Haivala discloses an apparatus for the electrolytic treatment of liquids (abstract). Haivala further discloses using pressure to produce jet streams into the electrodes (C3/L68-C4/L9 and C6/L23-36).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the streams of Herbst by using the pressure sprays of Haivala because the operative area of the electrode surfaces can be effectively used (C2/L5-13).

Regarding **claim 3**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses where the waste water is from sewage treatment facilities, streams or the like (C1/L15-23).

Regarding **claim 4**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses where the waste water to be cleaned could be double treated (C11/L36-42). Although Herbst, does not explicitly disclose two electrolytic cells, it would have been obvious to one of ordinary skill in the art to have two electrolytic cells for double treating the water. The mere duplication of parts,

without any new or unexpected results, is within the ambit of one of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960) (see MPEP § 2144.04).

Regarding **claims 5, 7 and 12-14**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses the outermost electrode being made of iron or aluminum (see examples I-II) and are readily replaceable (abstract).

Regarding **claim 8**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses that the outer electrode pipe (23) terminates prior to a waste water inlet (11) (see Fig. 1).

Although Herbst further discloses that the inner pipe (17) continues to the water inlet (11), Herbst does not explicitly disclose the inner pipe continuing past the water inlet by way of a valve to a wash water pump.

Haivala further discloses the water pump (14) connected to the anode through valve (15) (see Fig. 5 and C6/L28-36).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the inner pipe of Herbst by extending the pipe past the water inlet by way of a valve to a wash water pump of Haivala because the flow can be controlled (C4/L56-58).

Regarding **claims 10 and 15-16**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses the use of stainless steel as the inner electrode and iron as the outer electrode (see examples I-III and C9/L27-31 where different metals are used for the electrodes) and an insulating housing tube (C6/L67-68).

Regarding **claims 11 and 17-20**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses that inner and outer electrode pipes are locked concentrically to each other by means of end caps (30) that link to threads (25, 26) which surround the ends of the inner electrode pipe and inside which are retained the ends of the outer electrode pipe (see Fig. 1, where the threads are considered the unscrewable portion of the endcap).

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (US 4872959) in view of Haivala (US 5022974) as applied to claim 1 above, as evidenced by Till et al. ("Fe(0)-supported Autotrophic Denitrification").

Regarding **claim 2**, modified Herbst discloses all the limitations as set forth above.

Herbst, however, does not explicitly disclose the removal of nitrogen, using hydrogen ions for producing ammonium ions which escape upon coprecipitating with iron hydroxide precipitate, the precipitate rising along with the hydrogen gas in the form of flock to the surface of clean water, iron is oxidized and ammonium or nitrate nitrogen is reduced as: $6\text{Fe} + 2\text{H}^+ + 2\text{NO}_3 \leftrightarrow 6\text{FeO}\downarrow + \text{N}_2\uparrow + \text{H}_2\uparrow$ whereby the result is denitrification as nitrogen escapes in the form of nitrogen gas.

Although Herbst does not explicitly disclose denitrification, the use of a known technique to improve similar devices (methods or products) in the same way is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, C.). Applying a known technique to a known device (method or product) ready for improvement to yield predictable results is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, D.). Denitrification using cathodic hydrogen and iron is well known as evidenced by Till (abstract, see equations 1-4).

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (US 4872959) in view of Haivala (US 5022974) as applied to claim 8 above, as further evidenced by Suominen (US 5888359).

Regarding **claim 9**, modified Herbst discloses all the limitations as set forth above and Haivala further discloses that the flow of the inlet is controlled by the valve (C4/L56-58) and Herbst further discloses an outlet (see Fig. 1) adapted to be opened for discharging precipitate and wash water from the electrolysis space.

Although Herbst, does not explicitly disclose that the outlet duct has a valve connected, it would have been obvious to one of ordinary skill in the art at the time of the invention to add a valve like that of the inlet to the outlet duct (as evidenced by Suominen, see Fig. 1) because it controls the flow of the solution. The mere duplication of parts, without any new or unexpected results, is within the ambit of one of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960) (see MPEP § 2144.04).

9. Claims 11 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (Us 4872959) in view of Haivala (US 5022974) as applied to claim 8 above, as further evidenced by King (US 3972800).

Regarding **claims 11 and 17-20**, assuming that the applicant meant a separate unscrewable portion containing the threads, modified Herbst discloses all the limitations as set forth above and Herbst further discloses that inner and outer electrode pipes are locked concentrically to each other by means of end caps (30) that link to threads (25, 26) which surround the ends of the inner electrode pipe and inside which are retained the ends of the outer electrode pipe (see Fig. 1).

Herbst, however, does not explicitly disclose a separate unscrewable portion containing the threads.

It is well known in the art that the end cap can be placed directly or indirectly onto the electrodes (as evidenced by Herbst, see Fig. 1, or King, see Figs. 1-4 where the threads are on an extended portion separate from the electrodes). The change in configuration of the threads, whether directly or indirectly contacting the electrodes, is obvious absent persuasive evidence that the particular configuration is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN THAI whose telephone number is (571)270-1487. The examiner can normally be reached on Monday-Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

/SUSAN THAI/
Examiner, Art Unit 1795